

REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections contained in the Office Action of October 1, 2009 is respectfully requested.

By this Amendment, claims 6 and 7 have been amended, and claim 8 has been cancelled. Thus, claims 6 and 7 are currently pending in the application. No new matter has been added by these amendments.

On pages 2-3 of the Office Action, the Examiner rejected claims 6-8 under 35 U.S.C. § 103(a) as being unpatentable over Hasegawa et al. (US 5,650,024) in view of Scarlin et al. (US 5,415,706) or Shiga et al. (US 4,477,280). For the reasons discussed below, it is respectfully submitted that the amended claims are clearly patentable over the prior art of record.

Independent claim 6 recites a welded joint of a tempered martensitic heat resisting steel, wherein the heat resisting steel having a tempered martensite structure consists of the following elements by weight %, C: 0.03 to 0.15%, Si: 0.01 to 0.9%, Mn: 0.01 to 1.5%, Cr: 8.0 to 13.0%, Al: 0.0005 to 0.02%, Mo+W/2: 0.1 to 2.0%, V: 0.05 to 0.5%, N: 0.06% or less, Nb: 0.01 to 0.2%, B: 0.003 to 0.03%, and Co: 0.1 to 5.0%. Claim 6 also recites that the residue is composed of Fe and the following inevitable impurities, P: 0.03% or less, S: 0.01% or less, O: 0.02% or less, Mg: 0.01% or less, Ca: 0.01% or less, and Y and rare earth elements: a total amount of 0.01% or less. Claim 6 also recites that an area ratio of a microstructure depending on a microstructure of a base metal is 60% or more in a heat affected zone, and formation of fine prior austenite grains is suppressed in the heat affected zone.

Independent claim 7 recites a welded joint of a tempered martensitic heat resisting steel, wherein the heat resisting steel having a tempered martensite structure consists of the following elements by weight %, C: 0.03 to 0.15%, Si: 0.01 to 0.9%, Mn: 0.01 to 1.5%, Cr: 8.0 to 13.0%, Al: 0.0005 to 0.02%, Mo+W/2: 0.1 to 2.0%, V: 0.05 to 0.5%, N: 0.06% or less, Nb: 0.01 to 0.2%, B: 0.003 to 0.03%, Co: 0.1 to 5.0%, Ni: 0.5% or less and Cu: 1.7% or less. Claim 7 also recites that the residue is composed of Fe and the following inevitable impurities, P: 0.03% or less, S: 0.01% or less, O: 0.02% or less, Mg: 0.01% or less, Ca: 0.01% or less, and Y and rare earth elements: a total amount of 0.01% or less. Claim 7 also recites that an area ratio of a microstructure depending on a microstructure of a base metal is 60% or more in a heat affected zone, and formation of fine prior austenite grains is suppressed in the heat affected zone.

Hasegawa discloses a martensitic heat-resisting steel which includes several elements, as disclosed in columns 4-6 of Hasegawa. However, as noted by the Examiner on page 2 of the Office Action of March 9, 2009 (as referred to in the present Office Action), Hasegawa does not disclose a steel which consists of 0.003 to 0.03% B, and which also consists of aluminum as required by independent claims 6 and 7.

In this regard, the Examiner cites Scarlin as disclosing that it is known to add small amounts of B in steel alloys to further enhance hardenability, and cites Shiga as disclosing that it is known to add Al to steel alloys for deoxidizing. Thus, the Examiner concludes that it would have been obvious to one of ordinary skill in the art to modify the alloy of Hasegawa to include the small amounts of B and Al as taught by Scarlin and Shiga.

However, it is noted that Hasegawa discloses that the steel includes at least one of Ti, Zr, Ta and Hf in order to prevent "HAZ-softening" in the steel. In this regard, it is noted that claims 6 and 7 each recite that the steel consists of the identified elements, and thus excludes any elements not identified in the claims (as set forth in MPEP § 2111.03). As none of claims 6 and 7 identify Ti, Zr, Ta and Hf as being elements included in the steel, those elements are excluded from independent claims 6 and 7. Accordingly, as the elements Ti, Zr, Ta and Hf disclosed in Hasegawa are excluded from claims 6 and 7, Hasegawa does not disclose a steel which consists of the elements recited in independent claims 6 and 7.

Further, as originally discussed in the response previously filed on September 9, 2009, Hasegawa discloses that "the inclusion of Ti, Zr, Ta and Hf constitutes the foundation of the present invention" (see column 5, lines 65-66, emphasis added). Accordingly, it was argued in the response of September 9, 2009 that any combination of the steel of Hasegawa with elements disclosed in Scarlin or Shiga would necessarily include at least one of Ti, Zr, Ta and Hf as required by Hasegawa, as the exclusion of these elements would completely remove the "foundation" of the invention of Hasegawa and would thus render the steel of Hasegawa unsatisfactory for its intended purpose, as prohibited by MPEP § 2143.01.

In response to this argument, the Examiner notes on page 3 of the Office Action that it would have been obvious for one skilled in the art to omit Ti, Zr, Ta and/or Hf when its known function is not needed or desired. In this regard, the Examiner notes that Hasegawa discloses that the addition of Ti, Zr, Ta and/or Hf improves creep rupture strength at the HAZ weld. Further, the Examiner notes that page 9 of the specification of the present application discloses

adding Ti, Zr, Ta and/or Hf to the steel for the same purpose, and therefore the Examiner concludes that “for Applicant to eliminate Ti, Zr, Ta and/or Hf from its present invention where the function attributed to such element is not desired or required...would be an obvious expedient productive of no new and unexpected results.”

In this regard, it is noted that MPEP § 2141.02(VI) states that “a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention.” Further, as indicated above, MPEP § 2143.01(V) states that a proposed modification cannot render the prior art unsatisfactory for its intended purpose. In this regard, Hasegawa does not merely suggest the inclusion of Ti, Zr, Ta and/or Hf in the steel. Rather, Hasegawa explicitly states that “the inclusion of Ti, Zr, Ta and Hf constitutes the foundation of the present invention” (see column 5, lines 65-66, emphasis added), and therefore Hasegawa teaches away from the exclusion of Ti, Zr, Ta and Hf from the steel, as removing Ti, Zr, Ta and Hf from Hasegawa would completely remove the “foundation of the invention” of Hasegawa and would thus render Hasegawa unsatisfactory for its intended purpose.

Accordingly, it is respectfully submitted that the Examiner’s suggestion that it would have been obvious to exclude Ti, Zr, Ta and Hf from the steel of Hasegawa goes entirely against the teachings of Hasegawa, and that because Hasegawa explicitly discloses that the inclusion of Ti, Zr, Ta and Hf constitutes the foundation of the invention of Hasegawa, that any modification of Hasegawa in view of additional prior art would also have to include at least one of Ti, Zr, Ta and Hf.

Further, with regard to the Examiner’s reference to the specification of the present application as disclosing that the addition of Ti, Zr, Ta and/or Hf to the steel improves creep rupture strength, it is noted that Hasegawa explicitly requires the inclusion of at least one of Ti, Zr, Ta and Hf, and does not even remotely suggest that Ti, Zr, Ta and Hf can be excluded from the steel. In this regard, any portion of the present application which suggests that Ti, Zr, Ta and Hf are only optional ingredients cannot serve as a basis for rejection under § 103(a), as any such reasoning would constitute impermissible hindsight.

Therefore, it is respectfully submitted that it would not have been obvious to one of ordinary skill in the art to modify the steel of Hasegawa to exclude Ti, Zr, Ta and Hf in order to arrive at the inventions of independent claims 6 and 7.

In addition, it is noted that claims 6 and 7 each recite that the steel consists of N in an amount of 0.06% or less, and B in an amount of 0.003 to 0.03%. Further, Hasegawa discloses N in an amount of 0.01 to 0.25% and does not disclose B, while Scarlin discloses N in an amount of 0.1 to 0.3% and B in an amount of 0.001 to 0.03%. In this regard, the Examiner takes the position that it would have been obvious that it would have been obvious to modify the steel of Hasegawa (including 0.01 to 0.25% N, which overlaps the range of 0.06% N recited in claims 6 and 7) to include B in an amount of 0.001 to 0.03% as taught by Scarlin.

However, it is noted that MPEP § 2144.05 states that “Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range.” In this regard, it is noted that, in addition to the elements recited in claims 6 and 7, claims 6 and 7 also recite that an area ratio of a microstructure depending on a microstructure of a base metal is 60% or more in a heat affected zone, and formation of fine prior austenite grains is suppressed in the heat affected zone.

In particular, page 6, line 26 through page 7, line 6 of the original specification discloses that by adding of B to a tempered martensitic heat resisting steel, B is segregated on the grain boundary to lower grain boundary energy, therefore, nucleation and growth of nuclei of austenite grains not depending on the crystal orientation of original ferrite grains from the grain boundary of a tempered martensitic heat resisting steel exposed to temperatures of A_{C1} point or higher is suppressed, or nucleation and growth of recrystallized austenite grains is suppressed, and that as a result, there appears remarkably a phenomenon of transformation into austenite grains depending on the crystal orientation of original ferrite grains. Further, page 7, lines 15-18 of the original specification also disclose that when the content of N is over 0.06%, the amount of BN as a nitride with B increases, and consequently, the effect of B added lowers remarkably, and weldability also decreases.

In other words, the present application discloses that the claimed range of N in amount of 0.06% or less is critical in relation to the claimed range of B, because if N is added in an amount greater than 0.06%, the amount of BN as a nitride increases and thereby reduces the effect of B (*i.e.*, the suppression of fine prior austenite grains being formed in the heat affected zone, and the suppression of the growth of nuclei of austenite grains which do not depend on the crystal orientation of the base metal).

In this regard, as Hasegawa only discloses N and does not disclose B, and because Scarlin discloses B but discloses N in a range entirely outside of the claimed range, none of the Hasegawa and Scarlin references discloses or suggests an amount of N of 0.06% or less corresponding to the disclosed amount of B which would yield an area ratio of a microstructure depending on a microstructure of a base metal being 60% or more in a heat affected zone, and formation of fine prior austenite grains being suppressed in the heat affected zone, as required by independent claims 6 and 7.

Further, as indicated above, the Examiner cites Shiga as disclosing that it is known to add Al to steel alloys for deoxidizing. However, it is respectfully submitted that Shiga does not cure the defects of the Hasegawa and Scarlin references, as discussed above.

Therefore, for the reasons presented above, it is believed apparent that the present invention as recited in independent claims 6 and 7 is not disclosed or suggested by the Hasegawa reference, the Scarlin reference and the Shiga reference taken either individually or in combination. Accordingly, a person having ordinary skill in the art would clearly not have modified the Hasegawa reference in view of the Scarlin reference and the Shiga reference in such a manner as to result in or otherwise render obvious the present invention of independent claims 6 and 7.

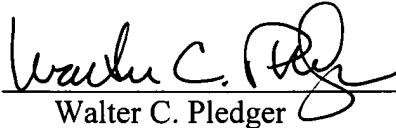
Therefore, it is respectfully submitted that independent claims 6 and 7 are clearly allowable over the prior art of record.

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. An early notice to that effect is respectfully solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

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